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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,246	01/23/2004	Donald Allen Pile	2007906-5286US (R087 1273	8048
23345	7590	08/04/2011	EXAMINER	
MCGUIREWOODS, LLP 1750 TYSONS BLVD SUITE 1800 MCLEAN, VA 22102			FELTON, AILEEN BAKER	
			ART UNIT	PAPER NUMBER
			1731	
			MAIL DATE	DELIVERY MODE
			08/04/2011	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* DONALD ALLEN PILE and HENRY J. JOHN Jr.

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Appeal 2011-008464  
Application 10/764,246  
Technology Center 1700

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Before ADRIENE LEPIANE HANLON, BEVERLY A. FRANKLIN, and  
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision<sup>1</sup> finally rejecting claims 1, 3-16, 18-22, 32-38, 40, 41, 44, and 45 under 35 U.S.C. § 103(a) as unpatentable over John (US 6,478,903 B1, issued Nov. 12, 2002) in view of either Boberg (US 5,654,520, issued Aug. 5, 1997) or Calsson (US 4,853,052, issued Aug. 1, 1989).<sup>2</sup> We have jurisdiction under 35 U.S.C. § 6(b).

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<sup>1</sup> Final Office Action mailed Dec. 27, 2007 ("Final").

<sup>2</sup> Appeal Brief filed May 29, 2008 ("App. Br.").

Appellants identified the present appeal as related to Appeal No. 2010-010383, filed on Aug. 4, 2009, in co-pending application SN 11/087,274, a continuation-in-part of the present application. (*See* Decision on Appeal No. 2010-010383, p. 2.) An oral hearing was conducted in Appeal No. 2010-010383 on July 20, 2011. The arguments and evidence relied on by the Examiner and Appellants in Appeal No. 2010-010383 are similar to those in the present appeal. We have decided these appeals concurrently.

Appellants do not present arguments in support of separate patentability of any particular claim or claim grouping. (*See generally*, App. Br.12-18.) Accordingly, we decide the appeal as to all of the claims on the basis of independent claim 1, which is reproduced below from the Claims Appendix to the Appeal Brief:

1. A priming mixture for small arms ammunition comprising:

a primary explosive selected from the group consisting of: trinitroresorcinol, mercury fulminate, lead azide, lead styphnate, silver azide, diazodinitrophenol, tetrazene, potassium dinitrobenzofuroxane, heavy metal salts of 5-nitrotetrazole, and any combination thereof; and

a non-hygroscopic, non-corrosive oxidizer system comprising bismuth oxide, wherein the bismuth oxide comprises at least 15% by weight of the priming mixture.

#### ISSUES

The Examiner finds that John discloses the invention as claimed in claim 1, with the exception of using bismuth oxide. (Ans.<sup>3</sup> 3.) The Examiner further finds that both Boberg and Calsson disclose the use of

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<sup>3</sup> Examiner's Answer mailed Aug. 21, 2008.

bismuth trioxide oxidizer in amounts greater than 15 % in primer compositions. (*Id.*) The Examiner concludes

[i]t would have been obvious to one of skill in the art at the time the invention was made to use the bismuth trioxide as taught by Boberg or Calsson with the composition of [John] since Boberg or Calsson suggests that the bismuth trioxide catalyst has been found to be applicable to priming mixtures generally and since [John] suggests the use of a bismuth salt for use in priming compositions.

(*Id.*) In addition, the Examiner points out “it is prima facie obvious to combine two compositions, each taught for the same purpose to yield a third composition for that very purpose.” (Ans. 3-4.)

Appellants’ traversal raises the following issues for our consideration:

1. Did the Examiner reversibly err in relying on Boberg and Calsson because they are non-analogous art?
2. Did the Examiner reversibly err in determining that one of ordinary skill in the art would have been motivated to modify John’s primer, which is designed for use in small firearms, based on Boberg or Calsson, which are primarily concerned with delay charges, and had a reasonable expectation of success in so doing?
3. Did the Examiner reversibly err in failing to give sufficient weight to Appellants’ evidence that Boberg and Calsson teach compositions having burn rates which would be unsuitable for use as a small arms primer?

We answer all three of these questions in the negative and, therefore, AFFIRM the Examiner’s rejections of claims 1, 3-16, 18-22, 32-38, 40, 41, 44, and 45 under 35 U.S.C. § 103(a) as unpatentable over (1) John in view of Boberg and (2) John in view of Calsson.

## FINDINGS OF FACT

### Appellants' Specification

The Specification defines “priming mixture” as

a combination of explosive and/or pyrotechnic type ingredients, which, when pressed into caseless ammunition or a primer cup or spun into the rim cavity of a rimfire shell, will explode or deflagrate upon impact by a firing-pin with the round of ammunition to ignite the propellant of the round and fire the bullet or slug of the round.

(Spec. 6:4-8.) “[M]ost common primer mixes are comprised of a primary explosive, an oxidizing agent and a fuel source.” (Spec. 1:11-12.)

The Specification defines the term “primary explosive” as “a sensitive explosive which nearly always detonates by simple ignition from an energy source of appropriate magnitude for a small arm, such as spark, flame, impact and other primary heat sources.” (Spec. 6:8-10.) “[P]rimary explosive’ . . . includes . . . mercury fulminate, lead azide, lead styphnate, silver azide, diazodinitrophenol (DDNP), tetrazene, potassium dinitrobenzofuroxane (KDNBF), heavy metal salts of 5-nitrotetrazole and other compounds that exhibit performance characteristics of handling, storage or detonation similar to these example compounds.” (Spec. 6:11-15.)

The oxidizer system [] include[s] bismuth oxide alone or in combination with one or more other or secondary oxidizers, such as potassium nitrate, zinc peroxide, manganese dioxide, molybdenum trioxide, strontium nitrate, strontium peroxide, barium nitrate, tin oxide, and iron oxide. These secondary oxidizers can be present in the oxidizer system in a range of generally about 0% to particularly about 99% by weight, about 10% to about 90% by weight, and more particularly about 30% to about 60% by weight.

(Spec.7:7-12.)

“The fuel can be either a metallic fuel or reducing agent, nonmetallic fuel, or combinations thereof[, and] . . . can constitute from about 0% to about 20% by weight of the priming mixture.” (Spec. 10:16-18.)

“Examples of potential fuels or reducing agents include aluminum, boron, calcium silicide, magnesium, magnesium-aluminum alloy, silicon, titanium, tungsten, zirconium and nitrocellulose.” (Spec. 10:18-20.)

### The Applied Prior Art

#### *John*

John “relates to explosives and more particularly to a primer charge.” (John, col. 1, ll. 5-6.) John specifically indicates that the inventive primer mix may be used as a percussion primer. (*See* col. 2, ll. 38-39.)

John’s primer is described as “non-toxic” (col. 1, l. 67) and comprises a primary, lead-free, explosive material, which may be DDNP and/or KDNBP. (*See* col. 3, l. 57-col. 4, l. 14.) The primer includes a “secondary explosive [which] is typically a sensitizer that accelerates the rate of conversion of the pyrotechnic system” (col. 4, ll. 26-27), such as tetrazene (col. 4, ll. 39-40).

John discloses that the primer includes one of two suitable oxidizer and fuel combinations: potassium nitrate and bismuth sulfide, or aluminum nitrate and zinc sulfide. (Col. 2, ll. 42-50.) “The primer mix can further include an added fuel that comprises between about 2 to 20% by weight of the primer mix. The added fuel can be either metallic, nonmetallic or combinations thereof.” (John, col. 4, ll. 55-58.) John provides the following list of exemplary additives for use with potassium nitrate/bismuth sulfide:

“nitrocellulose, aluminum, manganese and manganese oxide.” (Col. 2, ll. 8-13.)

*Boberg*

Boberg relates to a pyrotechnic charge that “can be used for various pyrotechnic objectives, for instance as a start charge, firing charge or transfer charge but the main use is as a delay charge.” (Col. 2, ll. 31-34; *see also*, col. 3, ll. 63-66.) The charge comprises bismuth oxide as an oxidation agent and silicon as a fuel. (Col. 2, ll. 49-51.) The components are said to be “non-poisonous . . . , non-hygroscopic and can be prepared in water[,] . . . are easily handled and have a low price.” (Col. 2, ll. 19-22.) In addition to bismuth oxide and silicon, “other reactive and/or inert pyrotechnic additives may be incorporated in order to modify the burn rate or otherwise influence the reaction properties.” (Col. 3, ll. 10-13.) “Examples of additives include fuels such as zirconium and boron or alternative oxidants such as iron oxide and manganese oxide or more inert components such as silicon oxide and titanium oxide.” (Col. 3, ll. 14-17.) According to Boberg, “particle size may [also] be used to influence the burn rate.” (Col. 3, ll. 48-49.)

*Calsson*

Calsson “relates to a method of producing pyrotechnical charges by mixing and granulating the included components in water.” (Abstract.) An advantage of preparing the charge in water is that explosion risks are virtually eliminated. (Col. 1, ll. 39-43.) According to Calsson, the method also allows variations in the percentage concentration of the included components so that the pyrotechnical charges can either be used as delay charges or as ignition charges. (Abstract; col. 1, ll. 63-67.) Moreover, various components may be included or excluded to provide a desired

burning rate and intensity. (See col. 2, ll. 28-38.) Calsson discloses the following general compositions for delay charges and ignition charges (col. 2, ll. 38-52):

% per weight	Delay charges	Ignition charges
Boron	3-20	0-20
Zirconium, titanium or alternatively zirconium-nickel alloys	6-20	40-60
Lead dioxide	0	up to 70
Tin dioxide	20-70	0
Zinc or alternatively aluminum stearate	0	up to 3.0
Titanium dioxide	10-45	0
Bismuth trioxide	0	up to 60
Binder	0.5-5.0	0.5-5.0

#### Appellants' Evidence in Support of Nonobviousness

Donald Pile, a named inventor in the present application as well as in John, testified that the primer mixes in John are for use in small arms ammunition and are not intended for use as, or with, compositions used for delay charges. (Decl.<sup>4</sup> ¶ 9.) Mr. Pile testified that “[t]o [his] knowledge, delay compositions are not used in small arms primer compositions because the resultant delay between trigger pull and firing would result in extremely unsafe firing conditions.” (*Id.*) Mr. Pile testified that Boberg and Calsson disclose burn rates for their primer compositions which are several orders of magnitude too slow for use in a small arms primer mix. (Decl. ¶¶ 17 & 19.)

#### PRINCIPLES OF LAW

A reference is considered analogous art if “even though it may be in a different field from that of the inventor's endeavor, it is one which, because

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<sup>4</sup> Declaration of Donald Allen Pile, executed Sep. 28, 2007 (“Decl.”).

of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem.” *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992).

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

*KSR Int'l Co. v. Teleflex, Inc.*, 550 US 398, 421 (2007).

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). When determining if a reference teaches away from an invention, all of the teachings of the reference must be considered in totality. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550-51 (Fed. Cir. 1983); *see also, In re Gurley*, 27 F.3d at 553 (providing that teaching away is a significant factor, but the nature of the teaching is highly relevant, and must be weighed in substance).

## ANALYSIS

Appellants argue that John is directed to small arms primer mixes which is a field of art unrelated to primer mixes used as delay charges, such as those of Boberg and Calsson. (*See App. Br. 13-17.*) Appellants, relying on the testimony of Mr. Pile, also argue

one of ordinary skill in the art would not find it obvious to try to modify the non-toxic primer mix of *John, Jr.* (developed as a substitute for lead styphnate based small arms primers) with the pyrotechnic delay charge taught by *Boberg*, or alternatively with the pyrotechnic delay or ignition charge taught by *Calsson*.

(App. Br. 14; *see also id.* 15-17 (relying on the testimony of Mr. Pile to establish that Boberg and Calsson teach compositions having burn rates which would be unsuitable for use as a small arms primer).)

Appellants appear to misapprehend the facts and reasons relied on by the Examiner in rejecting the claims and, as such, their arguments are not persuasive of error in the Examiner's obviousness determination. Specifically, the Examiner's rejection is not based on a determination that it would have been obvious to have substituted John's primer mix with the primer compositions of Boberg and Calsson. Rather, the Examiner's position is that it would have been obvious to have included bismuth trioxide in John's primer mix based on the teachings of the secondary references. (*See Ans. 4.*)

Even if delay charges are considered a different field of art from small arms primer mixes, Appellants have not persuasively explained why the ordinary artisan would not have logically looked to Boberg and Calsson in considering suitable oxidizers for use in primer mixes designed to detonate at high velocities. While Boberg and Calsson focus on delay charges, they also state that their primer mixes may be used for other types of charges, as acknowledged by Appellants (*see App. Br. 17*). Moreover, as further discussed below (*infra* p. 11), burn rate appears to be a function of the composition as a whole, i.e., there is no evidence that the ordinary artisan

would have viewed the oxidizer component of a delay charge composition as unusable in a different type of charge, including a small arms primer mix.

Further, we find that a preponderance of the evidence, taking into account the Pile Declaration, favors the Examiner's determination that one of ordinary skill in the art would have been motivated to include bismuth oxide in John's composition based on the teachings of Boberg or Calsson.

John discloses that, in addition to using one of two suitable oxidizer and fuel combinations, "[t]he primer mix can further include an added fuel that comprises between about 2 to 20% by weight of the primer mix." (John col. 4, ll. 55-57.) John does not particularly limit the added fuel, but broadly discloses that it may be metallic, nonmetallic or combinations thereof. Both Boberg and Calsson disclose that their bismuth oxide-containing primer compositions may be combined with fuels such as zirconium and boron. One exemplary additive used by John is manganese oxide (John col. 2, l. 13), which Boberg likewise identifies as an "alternative oxidant" for use in combination with bismuth oxide and silicon (Boberg, col. 3, ll. 14-17). Moreover, as pointed out by the Examiner (Ans. 3), John suggests the use of a bismuth salt.

In our view, the ordinary artisan would have understood from the teachings of the prior art (e.g., John's express statement that the disclosed primer mix may include 2-20% of other fuels and Boberg's and Calsson's indications that bismuth trioxide may be combined with the types of added fuels and oxidants contemplated by John) that bismuth oxide could successfully be used as an additional oxidant in John's composition and would have been motivated to include bismuth oxide to provide desired adjustments to the properties of John's primer. *Cf. Rolls-Royce, PLC v.*

*United Technologies Corp.*, 603 F.3d 1325, 1339 (Fed. Cir. 2010) (citing *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1351 (Fed. Cir. 2008) (holding as conditions in which “obvious to try” may negate patentability, “the problem is known, the possible approaches to solving the problem are known and finite, and the solution is predictable through use of a known option”)).

We have considered Appellants’ evidence, but are in agreement with the Examiner that it fails to demonstrate that one of ordinary skill in the art would have been discouraged from using bismuth oxide in John’s primer. The references indicate burn rate is a function of the composition as a whole (*see* Ans. 5 (“[I]t is the composition as a whole that causes the slower burn rate.”)), i.e., it is not solely dependent on the oxidizer component, and that burn rate can be modified by adjusting the amounts of components and including various additives. (*See* John *supra* 5 (noting the addition of sensitizer accelerates the rate of conversion of the pyrotechnic system); Boberg *supra* 6 (stating that other reactive and/or inert pyrotechnic additives may be incorporated to modify the burn rate or otherwise influence reaction properties, and noting that particle size can be used to influence the burn rate); Calsson *supra* 6 (noting that various components may be included or excluded to provide a desired burning rate and intensity).) In other words, Appellants’ evidence does not support a finding that one of ordinary skill in the art would have been discouraged from adding Boberg’s and Calsson’s oxidizer, bismuth trioxide, merely because Boberg’s and Calsson’s compositions, containing several additional components, are described as having much slower burn rates than would be desired in John’s small arms primer.

For the foregoing reasons, we are not persuaded of reversible error in the Examiner's obviousness determination. Accordingly, we affirm the Examiner's decision to reject claims 1, 3-16, 18-22, 32-38, 40, 41, 44, and 45.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED